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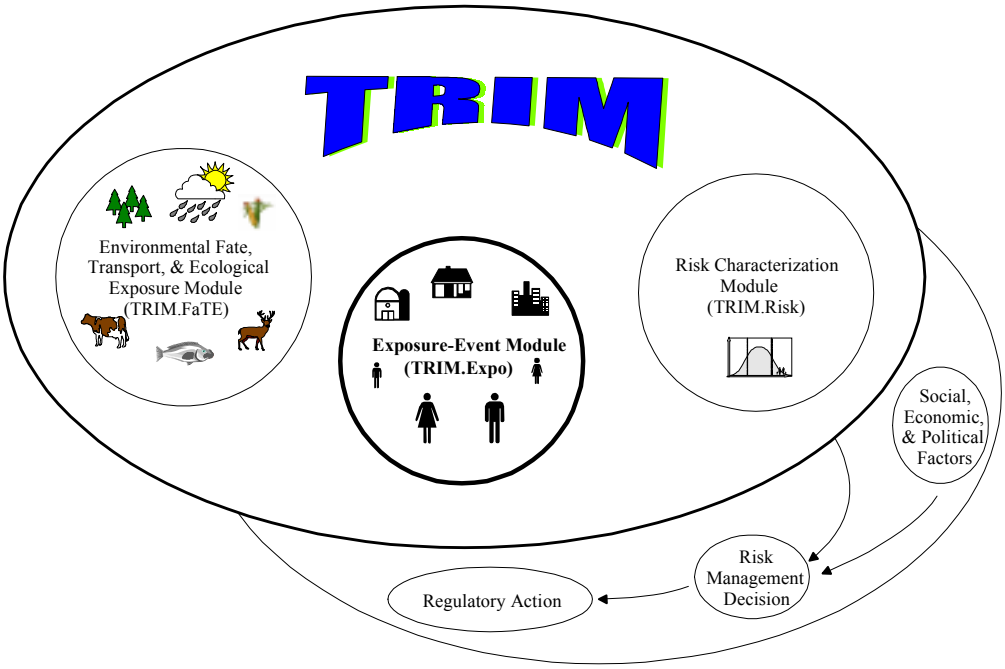
Air

TRIM
Total Risk Integrated Methodology

TRIM.Expo
TECHNICAL SUPPORT DOCUMENT

EXTERNAL REVIEW DRAFT



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EPA-453/D-99-001

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U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

External Review Draft
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As described in this report, the Office of Air Quality Planning and Standards (OAQPS) of the U.S. Environmental Protection Agency is developing the Total Risk Integrated Methodology. The principal individuals and organizations in the TRIM.Expo development effort and in the preparation of this report are listed below. Additionally, valuable technical support for report development was provided by ICF Consulting.

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PREFACE

This draft document, the *TRIM.Expo Technical Support Document*, is part of a series of documentation for the overall Total Risk Integrated Methodology (TRIM) modeling system. The detailed documentation of TRIM's logic, assumptions, algorithms, equations, and input parameters is provided in comprehensive Technical Support Documents (TSDs) for each of the TRIM modules. The purpose of the TSDs is to provide full documentation of how TRIM works and of the rationale for key development decisions that were made. This report documents the Exposure-Event module of TRIM (TRIM. Expo).

To date, EPA has issued draft TSDs for the Environmental Fate, Transport, and Ecological Exposure module (*TRIM.FaTE TSD*, U.S. EPA 1999a,b) and the TRIM. Expo (this report). When the Risk Characterization module (TRIM.Risk) is developed, EPA plans to issue a TSD for it. The TSDs will be updated as needed to reflect future changes to the TRIM modules.

The EPA has also issued the 1999 *Total Risk Integrated Methodology (TRIM) Status Report* (U.S. EPA 1999c). The purpose of that report is to provide a summary of the status of TRIM and all of its major components, with particular focus on the progress in TRIM development since the 1998 *TRIM Status Report* (U.S. EPA 1998a). The EPA plans to issue status reports on an annual basis while TRIM is under development.

In addition to status reports and TSDs, EPA intends to develop detailed user guidance for the TRIM computer system. The purpose of such guidance will be to define appropriate (and inappropriate) uses of TRIM and to assist users in applying TRIM to assess exposures and risks in a variety of air quality situations.

Comments and suggestions are welcomed. The OAQPS TRIM team members, with their individual roles and addresses, are provided below.

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ACRONYMS

ACH	Air Exchange Rates
ADD	Average Daily Dose
AirPEX	Air Pollution Exposure Model
AIRS	Aerometric Information Retrieval System
AMEM	ADL Migration Exposure Model
APEX	Air Pollutant Exposure Model
ARB	Air Resources Board
ASPEN	Assessment System for Population Exposure Nationwide
BEADS	Benzene Exposure and Absorbed Dose Simulation
BEAM	Benzene Exposure Assessment Model
BM	Body mass
BOC	Bureau of Census
BW	Body weight
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CalTOX	California Total Exposure Model for Hazardous Waste Sites
CHAD	Comprehensive Human Activity Data
CMAQ	Community Multi-scale Air Quality
CO	Carbon monoxide
CONSEXPO	Consumer Product Exposure Model
CPIEM	California Population Indoor Exposure Model
DEPM	Dietary Exposure Potential Model
DERM	Dermal Exposure Reduction Model
DOE	U.S. Department of Energy
ECF	Energy conversion factor
EDMAS	Exposure and Dose Modeling and Analysis System
EE	Energy expenditure
EML	Exposure Models Library
EPA	U.S. Environmental Protection Agency
ETS	Environmental tobacco smoke
GEMS	Graphical Exposure Modeling System
GIS	Geographic information system
GUI	Graphical User Interface
HAP	Hazardous air pollutant
HAPEM4	Hazardous Air Pollutant Exposure Model, Version 4
HEM	Human Exposure Model
HPI	Hazard Potential Index
HVAC	Heating, ventilation, and air conditioning
IAQM	Indoor Air Quality Model
IEM	Indirect Exposure Methodology Model
IMES	Integrated Exposure Models Evaluation System
INTOXX	Integrated Toxic Expected Exceedance
ISC	Industrial Source Complex
ISCLT	Industrial Source Complex, Long-term
ISCST	Industrial Source Complex, Short-term

ISMCM	Integrated Spatial Multimedia Compartmental Model
LADD	Lifetime Average Daily Dose
LSODE	Livermore Solver for Ordinary Differential Equations
MAVRIQ	Model for Analysis of Volatiles and Residential Indoor Air Quality
MCCEM	Multi-Chamber Concentration and Exposure Model
MENTOR	Modeling Environment for Total Risk Studies
MEPAS	Multimedia Environmental Pollutant Assessment System
MET	Metabolic equivalent of work
MIMS	Multimedia Integrated Modeling System
MMSOILS	Multimedia Contaminant Fate, Transport, and Exposure Model
MPE	Multiple Pathways of Exposure
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standard
NAMS	National Air Monitoring Station
NAS	National Academy of Sciences
NASQAN	National Stream Quality Accounting Network
NATA	National Air Toxics Assessment
NCC	National Computing Center
NCEA	National Center for Environmental Assessment
NCHS	National Center for Health Statistics
NEM	NAAQS Exposure Model
NHAPS	National Human Activity Pattern Survey
NHIS	National Health Interview Survey
NIST	National Institute of Standards and Technology
NOPES	Non-occupational Pesticides Exposure Study
NRC	National Research Council
OAQPS	EPA Office of Air Quality Planning and Standards
OMS	EPA Office of Mobile Sources
ORD	EPA Office of Research and Development
OW	EPA Office of Water
PBPK	Physiologically-based pharmacokinetic
PC	Personal computer
PDF	Probability density function
PEC	Predicted environmental concentration
PEM	Personal exposure monitor
pHAP	Probabilistic Hazardous Air Pollutant Exposure Model
$PM_{2.5}$	Particulate matter with aerodynamic size diameter of 2.5μm or less
PM_{10}	Particulate matter with aerodynamic size diameter of 10μm or less
pNEM	Probabilistic National Ambient Air Quality Standards Exposure Models.
PNL	Pacific Northwest Laboratory
PTEAM	Particle Total Exposure Assessment Methodology
RESRAD	Residual Radiation
RIA	Regulatory impact analysis
RMR	Resting metabolic rate
SAB	EPA's Science Advisory Board
SCIES	Screening Consumer Inhalation Exposure Software
SCREAM2	South Coast Risk and Exposure Assessment Model, Version 2

SHAPE	Simulation of Human Activities and Pollutant Exposure
SHEDS	Stochastic Human Exposure and Dose Simulation
SLAMS	State and Local Air Monitoring Stations
STAR	STability ARray
STORET	Storage and Retrieval
TAP	Time Activity Patterns
TEAM	Total Exposure Assessment Methodology
THERdbASE	Total Human Exposure Risk database and Advance Simulation Environment
TOXLT	Toxic Modeling System, Long-term
TRIM	Total Risk Integrated Methodology
TRIM.Expo	TRIM Exposure-Event module
TRIM.FaTe	TRIM Environmental Fate, Transport, and Ecological Exposure module
TSD	Technical Support Document
USES	Unified System for the Evaluation of Substances
USGS	U.S. Geological Survey
VOC	Volatile organic compound

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